Patent Application of

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for

TITLE: REPOSITIONABLE ADHESIVE MOUNTED FABRIC ASSEMBLY AND DECORATION PROCESS

CROSS-REFERENCE TO RELATED APPLICATIONS Not Applicable

FEDERALLY SPONSORED RESEARCH Not Applicable

SEQUENCE LISTING OR PROGRAM Not Applicable

BACKGROUND OF THE INVENTION—FIELD OF INVENTION

This invention is in the area of processes and apparatus for facilitating sewing, assembly, and decoration of articles made of fabric or other sheet-like materials.

BACKGROUND OF THE INVENTION

Sewing and assembly of fabric materials into a finished product is usually considered a skilled task. For some sewing activities a high degree of skill could be required. Often some measure of artistic ability is needed as well.

Numerous sewing aids have been developed to facilitate the process of sewing and assembly of fabric materials.

One of the more laborious and time-consuming tasks in this field is the operation of cutting and laying out the fabric panels which go into a sewn item. Sets of patterns have long been available for popular designs and styles of clothing. These patterns usually come in the form of tissue-paper panels. Depending on the size of the person for whom the clothing is being made, the patterns may need trimming before use. These patterns are usually pinned in place on a sheet of fabric, and the effectiveness of the whole process could be affected by the number of pins used. The more pins used, the more the pattern will guide the cutting and sewing operations. Of course the pins must be removed before or during the sewing operation. The tissue patterns lend little or no rigidity to the fabric, such as to assist in holding or positioning the article during assembly. An alternative to pinning the above patterns in place is to use weights to hold them down on the fabric. This of course is very unwieldy and diminishes the overall value of the pattern during cutting, and would have no value during sewing.

Pattern 5,958,802 concerns a webbing material which is coated with a repositionable adhesive on both sides. The purpose of this webbing is to adhere a paper pattern to a cloth panel, without the need of pins. However this approach still lends no real stiffness to the fabric being assembled. Also, as with pinning, the pattern and webbing must be removed or at least partially pulled away from the fabric during sewing, to avoid sewing the webbing and pattern onto the finished item.

Pattern 4,642,896 concerns the design of variously shaped adhesive markers which can be stuck onto fabric panels at multiple places to guide the cutting and sewing process. Similar to the pinning operation however, the effectiveness of these markers will depend greatly on how many are used. While it is mentioned by the inventor that these markers should be "tearable" in case one gets sewn to the finished item, it is clear that she places great premium on the reusability of the markers, and that they are not intended to remain in place, such as to be sewn onto the finished item.

Other types of aids have been developed to facilitate decoration of fabric items. Examples would be embroidery or needlepoint decorations on a cloth panel. Patent 4,634,616 concerns a mylar sheet for "stenciling" of artwork on a needlepoint canvas. In addition to colored artwork for the desired decoration, the mylar stencil has a superimposed grid of the same proportions as the needlepoint canvas. By cutting the artwork out and adhering it to the canvas, the "stencil" will serve as a guide for placing threads of the desired color, and such as to approximate the artwork design. However, the mylar stencil is not intended to be sewn through. Rather the sewer probably lifts the edges of the stencil and sews around the edges. As such this isn't really a stenciling method. Rather it is more of a visual transfer method.

Patent 4,154,181 seems to be a refinement over patent 4,634,616, which is closer to what would be expected of a stencil method. Rather than embodying the fine details of a piece of artwork, the stencil embodies grosser details. That is there are larger open areas where the sewer can sew through with the stencil in

place. Then the stencil is removed, and the details of the artwork are sewn in by eye alone.

Other types of sewing aids are available to facilitate attachment of highly detailed artwork or embellishments to a fabric item. Patents 4,788,922, 3,463,692, and 1,171,155 concern aids or processes which allow transferring of embroidery-like designs to a fabric item. The design is actually embroidered on a substrate. This substrate is composed of a cellulose layer which will degrade upon application of sufficient heat. The substrate also has a heat-activated adhesive layer. The principle behind these processes is that the "embroidery" is positioned on the fabric item. Then sufficient heat is applied to simultaneously activate the adhesive layer and to decompose the cellulose layer. These processes don't facilitate the actual embroidery process. Instead they produce an inferior finished item which features "pasted on" artwork, rather than true embroidery artwork. The temperatures required to in the heating process are high enough to damage many fabrics. Further, the exposure to the fibrous dust from the decomposed cellulose layer could be dangerous for humans to breathe, and would at the least be a messy process. Finally the production of the artwork itself requires highly specialized and thus relatively expensive materials for the substrate.

Other processes have been developed to facilitate decoration of fabrics. These processes concern mounting of fabric panels on a stiff backing material such as paper. The fabric is mounted using a repositionable adhesive. The stiff backing facilitates automated printing of designs or indicia on the fabric. Patents US6,651,642B2, 5,922,625, and 5,515,093 describe such processes. However

these in no way facilitate the cutting, layout and assembly of the fabric panel into a finished item. In fact, patent US6,561,642B2 envisions one of its primary advantages to be a novel way to remove the paper backing in an automated way.

BACKGROUND OF THE INVENTION – OBJECTS AND ADVANTAGES

The process described herein will greatly lessen the skill levels required to perform many tasks related to cutting, layout, assembly, and decoration of fabric materials. Some of these operations could now entail the use of relatively unskilled labor, or even of complete automation of the operation. Some embodiments of this process will entail little or no special material or equipment. Any specialized equipment or materials will be easily acquired or implemented. The principles applied in this process will be straightforward and easy to integrate into existing manufacturing processes. The embodiments of this process will also entail no hazardous materials.

The primary embodiment of the process will enable decomposing the production of many fabric items into operations, each of which can be performed or monitored by relatively unskilled labor. This process will also facilitate automation of many of these operations. Take for consideration, the primary embodiment of the process, depicted in FIGS. 2A to 2I. Note how the assembly of a fabric bag has been decomposed into a few discrete operations which require little or no skill to perform. The only basic skills involved are some measure of physical dexterity. Little or no training would be required to master the operations of cutting perforations along guidelines, sewing along a perforation, or prying up an adhered

paper backing and tearing it along a perforation. Most or all of these operations could be automated as well, which would further the lessen the skills needed for human participants in the process.

Another benefit is that the mounting on a stiff backing of certain types of fabrics, which have a tendency to bunch up and distort during high speed sewing, will reduce this tendency.

The various embodiments of this process will also speed the production of many fabric items. This along with the lowering of the labor cost involved will greatly reduce the eventual cost of such items to the public.

Some embodiments of this process could also have benefits for handicapped people who otherwise could not perform a given operation. Take for example the assembly shown in FIG. 2E. This assembly is composed of two mounted fabric panels stapled together. It could readily be held by someone partially handicapped, such as by arthritis, and guided through a standard sewing machine.

This process will also remove some of the hazards involved in decoration of fabric items. The "faux embroidery" attachment process discussed above, exposes the user to hazardous cellulose dust. Utilizing the embodiment of my process shown in FIGS. 5A through 5C will enable users to easily rough in a true embroidery design. They can then fill in the finer details, and retain the satisfaction of demonstrating some true craftsmanship.

DRAWINGS-- FIGURES

FIG. 1 shows a view of a fabric article in the latter stages of assembly with the aid of the process described herein.

FIGS. 2A to 2I show the details of the preferred embodiment of the repositionable adhesive mounted fabric assembly system.

FIGS. 3A to 3D show the details of assembly for a second basic embodiment of the repositionable adhesive mounted fabric system.

FIGS. 4A to 4C show the details of assembly for a third basic embodiment of the repositionable adhesive mounted fabric assembly system.

FIGS. 5A to 5C show a variation of one or more of the embodiments which is particularly adapted to decoration of a fabric or sheet-like panel, such as for needlepoint or embroidery work.

FIGS. 6A to 6D show a variation of one or more embodiments of the process described herein, which uses a masking operation to ease removal of the adhesive mounted backing.

FIGS. 7A to 7I show an application of the process applied to assembling a more complex item, such as a garment

DETAILED DESCRIPTION - FIG. 1 - TYPICAL EMBODIMENT

This figure illustrates many of the benefits of the process. Fabric panel 1 is only partially visible as it is adhered to mounting panel 3 by means of a repositionable adhesive. Perforated line 7 and sewn seam 9 are shown in the blowup, along with torn perforations 5. These features are indistinguishable in the main part of the figure. The distance between perforated line 7 and seam 9 are

purposely exaggerated in the blowup. A section of mounting means 3 is shown being torn at perforation 7, and lifted from fabric panel 1. Due to the perforations the mounting means will not be sewn to the surface of the fabric, and can be pulled up around the sewn seam 9. Sewing is only a typical assembly means utilized in the invented process, and this process is fully applicable to other types of assembly means, for example a stapling operation, or perhaps a fusing of fusible materials. In this embodiment perforated line 7 serves as a guide for sewing the seam 9, and will later serve as a guide or pattern for trimming the piece. Threads 11 are a typical artifact of a sewing machine operation.

DETAILED DESCRIPTION - FIG 2A TO FIG 2I--PREFERRED BASIC EMBODIMENT

FIG. 2A shows a mounting means 3, in this example a sheet of paper, which has a repositionable adhesive on the back side. This mounting means in this example has a disposable backing, which is not visible in this view, in order to aid in handling of the mounting means. This configuration is only typical of the process. The mounting means could enter this process in a variety of manners. As an example this could be a continuous process where the mounting means comes off a roll and adhesive is applied and dried as the mounting means is unrolled. Perforated line 7 is shown, which will serve as a guide for an assembly operation. Line 7 is depicted as already layed down on mounting means 3. Production of line 7 could also be otherwise produced, such as within a continuous process using a multi-bladed perforating tool or roller. Finally registration holes 11 are shown as

typical means to later position a mounted fabric panel for assembly, such as with a mating assembly.

FIG. 2B shows the mounting means 3 being pulled away from its removable backing 13.

FIG. 2C shows mounting means 3 being positioned and adhered to a fabric panel 1. As above this is only a typical manner of mating a mounting means to a sheet-like panel. For example this operation could also be part of a continuous operation such as that mentioned in the discussion of FIG. 2A, where the fabric could be continuously pulled from a roll, and cut to size as needed.

FIG. 2D shows two mounted fabric panel assemblies, now referenced as 15 being registered to each other with aid of registration holes 11, and dowel pins 17. This is only a typical means of registering such assemblies, and the same results could be achieved in numerous ways, one example of which might be a some kind of fixture to align the edges of the assemblies.

FIG. 2E shows the assemblies joined together with staples 19, the full assembly now referenced as 16. 16 is being presented to sewing machine 21. Note how the assembly 16 could have been readily produced using totally automated operations. Also note that the rigidity and compactness of 16 can now serve as an aid in manual or automatic presentation to sewing machine 21.

FIG. 2F shows assembly 16 after the typical sewing operation. Seam 23 now joins the two fabric panels mounted within assembly 16. Hanging threads 11 are typical artifacts of the sewing operation. A section of mounting means 3 is shown being lifted and torn along perforated line 7, which is obscured by seam 23. Torn

perforations 5 are visible along the edge of the section being lifted. A similar operation can later be carried out on the lower section of assembly 16.

FIG. 2G shows the result of removing the outer section of mounting means 3 (see FIG. 2F). Only the inner section of the mounting means remains adhered to sheet-like panel 13. This section is labeled 25 and is bounded by seam 23. Note staples 19 from FIG. 2F are shown as having been removed, although they may alternately have been left in place. Cutting tool 27 is shown being used to trim around seam 23.

FIG. 2H shows item 29 in its near final state of assembly. It is composed of sections of two fabric panels which have been assembled together with seam 23. It still has sections 25 of the mounting means adhered to each side. The top section 25 is shown being lifted from the fabric panel. Visible are torn perforations 5. A similar operation can later be carried out on the lower side of what remains of assembly 16. It will often be the case that some finishing operations could be required for the item being assembled. An example for the item illustrated could be serging of the fabric ends outside seam 23. Another example could be hemming of the opening of item 29, or perhaps attachment of handles near the opening. It is clear that the semi-rigid state of the assembly in FIG. 2H, along with the standardization of dimensions afforded by this process would greatly facilitate many finishing operations, including presentation and registration within custom fixtures for finishing work. Lines printed or drawn on the mounting means in strategic places could serve as guidelines for machinery capable of using sensors or artificial vision for tracking such a line.

FIG. 2I shows the completed assembly 29, which has been achieved by removing all mounting means sections from FIG. 2H, and then turning the results of that operation inside out to hide the assembly seams.

DETAILED DESCRIPTION—Fig3A THROUGH Fig 3D--SECOND BASIC EMBODIMENT

FIG. 3A shows the beginning step in assembling fabric or sheet-like materials, which have previously been adhered to a mounting means using repositionable adhesive. Then the mounted panel is subjected to a printing process such as to produce artwork or indicia on the panel. Imprinted panel 43 is adhered to mounting means 41. For consistency in referring to some previous drawings, registration holes 11 are shown here as well. However use of registration holes within this embodiment of the process are merely typical.

FIG. 3B shows the mounted assembly from FIG. 3A being turned over and laid flat, whereupon the imprinted indicia will be face down on the work surface, and the mounting means will be face up.

FIG. 3C shows the use of a typical controlled-depth perforation tool 45 being used to cut a perforation pattern 7 into the mounting means. Such a tool must be capable of producing perforations which cut substantially through the mounting means, but do not cut into and thus damage the mounted fabric or sheet-like panel. This operation could be facilitated by means of drawing or printing line a line onto the mounting means, such as to guide the use of perforating tool 45. Perforating tool 45 shown here is merely typical of the kinds of perforating tooling that could be

used for this embodiment of the process. Controlled-depth perforation could clearly be accomplished through a precision stamping operation, which for-instance utilized registration holes 11 to position the assembly without need of guide lines. In addition a scoring operation could be used instead of a perforating operation, whereby the mounting means is cut or scratched to a controlled-depth. Assembly operations such as sewing would then serve to further perforate the scored area. Following the operations of FIG. 3C the mounted fabric panel is essentially in the state of the assembly in FIG. 2C. Reference now FIG. 2D through FIG. 2H for the manner in which the mounted panel of 3C is mated with a similar assembly, which may or may not have imprinted indicia, and assembled into the finished item 51 in FIG. 3D. Item 51 is seen to be structurally identical to item 29 in FIG. 2H. 51 differs only in that it is embellished with indicia on one or more sides.

DETAILED DESCRIPTION - FIG. 4A TO FIG. 4C - THIRD BASIC EMBODIMENT

FIG. 4A shows an assembly similar to that in FIG. 3B. It is a fabric or sheet-like panel mounted on mounting means 41 using a repositionable adhesive. The fabric or sheet-like panel is not visible in FIG. 4A, as it is face down on the work surface. Guide line 53 has been printed or drawn onto the back of mounting means 41. Registration holes 11 are shown here for consistency when referencing previous drawings, and are only typical for this embodiment of the process. We will assume that the sheet-like or fabric panel has been imprinted with indicia, however this embodiment of the process is equally applicable for assembly of mounted fabric or sheet-like panels which have no indicia.

FIG. 4B shows an assembly similar to that in FIG. 4A being positioned under the assembly from FIG. 4A. Note the edge of the sheet-like or fabric panel 43 is visible for the underside assembly. Thus the fabric or sheet-like panels will be sandwiched between the two mounting means to which they are adhered.

FIG. 4C shows the two assemblies of mounted fabric or sheet-like panels now pressed flat and held together with staples 19. Use of staples is only typical for this embodiment of the process, and the same results could be achieved through various other means, such as holding them by hand, or within a fixture, or perhaps taping them together. Machine 55, being a conventional sewing machine head integrated with a tool for perforating or scoring the mounting means to a controlled depth is shown. Line 53 now serves as a guide for the assembly operation. The apparent distance between the sewing head and the perforation tool 45 is intentionally exaggerated for illustration purposes. The strict appearance of machine 55 is only typical for this embodiment of the process. Other variations could employ another precision perforation or scoring tool to operate on the mounting means on the lower side of the stapled assembled. Following the completion of the operation in FIG. 4C, the same operations as illustrated in FIG. 2F through 2H can be used to yield a finished item as shown in FIG. 2I or FIG. 3D.

DETAILED DESCRIPTION - FIG. 5A TO FIG. 5C - FOURTH BASIC EMBODIMENT

FIG. 5A shows a mounting means 57 which is adhered to fabric or sheet-like panel 58 with a repositionable adhesive. Perforations or scoring marks 59 have been produced onto 57, which will serve as guides for applying decorations to the fabric

or sheet-like panel 58. A typical sheet-like panel for this kind of decoration process could be an embroidery canvas, although this embodiment of the process applies equally to any kind of fabric or sheet-like panel. Note also the presence of cuts or slits 60, which have been strategically placed within enclosed areas of the artwork outlines. A further variation, though not required, would be to have lines printed or drawn along the perforated guide 59, which are of different colors as necessary to facilitate producing multi-colored designs.

FIG. 5B shows an enlarged view of the artwork outline 59 from FIG. 5A. A seam 61, such as through standard stitching, needlepoint or embroidery operations has been produced to produce the grill-work design on the underlying fabric or sheet-like panel.

FIG. 5C shows section 63 of mounting means 57 being pulled up and torn along the perforations or scoring marks bordering seam 61. Torn perforations 5 are visible along the edge of section 63. Slit or cut 60 has been used as a point of purchase to pull up section 63. However, slit 60 is only a typical facilitation for this embodiment of the process, and section 63 could alternatively have been pulled up starting along perforations or score marks bordering the edge of seam 63. It is clear that remaining sections of artwork guide 59 can be handled in a similar manner, such as to produce all or most of the details of an artwork design onto fabric or sheet-like panel 58.

DETAILED DESCRIPTION - FIG. 6A TO FIG. 6D - OPTIONAL OPERATIONS TO ENHANCE THE BASIC EMBODIMENTS OF THE PROCESS

FIG. 6A depicts a typical operation to facilitate removal of mounting means sections for any of the embodiments of this process. A mounting means 65 is shown with perforated line 7.

FIG. 6B shows mounting means 65, and masking means 67 being applied such as to cover line 7.

FIG. 6C shows application of a repositionable adhesive 69 onto mounting means 65.

FIG. 6D shows the removal of masking means 67, which reveals perforated line 7 with a buffer area around it which does not have adhesive present. It is clear that the operation of tearing and lifting mounting means from a fabric or sheet-like panel, such as discussed and illustrated previously, will be facilitated by such a buffer area. It is also clear that the production of such a buffer area without presence of adhesive can be produced, as illustrated in FIG. 6A through FIG. 6B is only typical. Other methods such as precision spraying or rolling operations would accomplish the same purpose.

DETAILED DESCRIPTION - FIG. 7A TO FIG. 7I - FIFTH BASIC EMBODIMENT

FIG. 7A shows various fabric panels which are the components of a simple vest garment. Fabric is only a typical material which can be utilized with this process, and a vest is only a typical example of a complex item which can be facilitated by the repositionable adhesive mounted fabric process. Fabric panels 75, 77, and 79

will be assembled using this process. They are mounted with a repositionable adhesive onto mounting means 81, 83, and 85 respectively.

FIG. 7B shows these assemblies from FIG. 7A now turned over. It is seen various curvilinear perforated lines have been laid down onto the mounting means 81, 83, and 85. Perforated lines 87, 89, 93, 95, 97, 99, and 101 will serve as guides for seams to fasten the various fabric panels together in a later operation. Gore-shaped perforation lines 91 and 103 will serve as guides for trimming and sewing tucks into the front of the vest.

FIG. 7C shows the vest back assembly face up, but hidden by the two vest front assemblies now laid on top of it. This is in preparation to begin assembly of the fabric panels together.

FIG. 7D shows seams 105, 107, 109, and 111 having been sewn through the perforation guidelines.

FIG. 7E shows a gore shaped section 113 of the backing means formed by tearing along the perforation line 91 (from FIG. 7D).

FIG. 7F shows the gore shaped piece of backing means now removed and fabric panel 75 now visible. Scissors 115 is being used to trim fabric panel 75, using the edges of the mounting means as a guide.

FIG. 7G shows the right side of the mounted assembly folded over along the line formed by the edge of the gore-shaped area removed from the mounting means in FIG. 7E. A seam can now be sewn with sewing machine 21, which will become one of the tucks on the front of the vest.

FIG. 7H shows the assembly after sewing of seam 117 to form the tuck. Section

119 is being lifted away from the fabric, which is what is left of mounting means 81 (from FIG.7A) after removal of the gore shaped piece in FIG. 7E.

FIG. 7I shows the completed vest, which is arrived at by repeating the operations from FIGS. 7E through 7H for the other tuck, then removing all remaining sections of mounting means, and then turning the result inside out. As with previous embodiments of this process, a real assembly operation could entail various finishing operations, such as hemming, serging, attachment of cuffs or collars, or even decoration. The various benefits of the process can be used to facilitate these operations as well, and the highly simplified task illustrated here is only typical. The stiffness lent by the mounting means can serve to facilitate position and holding by human or machine. The use of perforated, scored, or cut lines can serve to facilitate multiple trimming, folding, finishing, and decorating operations.

CLAIMS:

I Claim:

1. A process for assembly or decoration of fabrics or other sheet-like materials, composed of the following:

a. Usage of a sheet-like mounting means, such as a paper sheet, with repositionable adhesive applied to one side of the mounting means.

b. Perforation or scoring of the mounting means, such as to serve as a guide for sewing or other type of assembly operation, or to serve as a guide in applying decorations.

c. Mounting of a fabric panel or other sheet-like material to the mounting means.